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JUNE 1993

ANNUAL REPORT OF THE 1992 WESTERN PACIFIC LOBSTER FISHERY

ROBERT A. DOLLAR

Honolulu Laboratory
Southwest Fisheries Science Center
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

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Southwest Fisheries Science Center
Administrative Report H-93-09

ANNUAL REPORT OF THE 1992 WESTERN PACIFIC LOBSTER FISHERY

Robert A. Dollar

Honolulu Laboratory
Southwest Fisheries Science Center
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

with contributions from

Southwest Region
Pacific Area Office
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

Western Pacific Regional Fishery Management Council
Honolulu, Hawaii 96813

Southwest Enforcement
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96850

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PREFACE

The Fishery Management Plan (FMP) for the western Pacific crustacean fisheries was prepared by the Western Pacific Regional Fishery Management Council (WPFMC) and went into effect in 1983. Lobster permits are issued by the Regional Director, Southwest Regional Office, National Marine Fisheries Service (SWR, NMFS). These permits allow lobster fishing operations in the U.S. Exclusive Economic Zone (EEZ) from 3 to 200 nmi offshore American Samoa, Guam, Hawaii, the Northern Mariana Islands, and U.S. possessions in the western Pacific. The Fishery Monitoring and Economics Program (FMEP) of the Honolulu Laboratory, Southwest Fisheries Science Center, NMFS, NOAA, collects biological and economic information exclusively from vessels permitted to fish in the Northwestern Hawaiian Islands (NWHI). All information presented in this report pertains only to NWHI. Information on other areas is confidential because less than three Federally permitted lobster vessels fished in any of those areas.

In addition to the FMEP, other NMFS agencies contributed to this report. The Insular Resources Investigation of the Honolulu Laboratory provided a summary of the biological research and assessment on the fishery (Haight and Polovina 1992), and Alvin Z. Katekaru of the Southwest Region, Pacific Area Office (PAO), NMFS, provided information on administrative activities. Dick Phillips of Phillips Sales contributed marketing and economic information, Robert F. Harman of the Council's staff prepared information on Council-related activities, and Southwest Enforcement (SWE), NMFS, furnished details on enforcement operations.

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INTRODUCTION

The Northwestern Hawaiian Islands (NWHI) are an isolated range of islands, islets, banks, and reefs which extends 1,500 nmi northwest of the main Hawaiian islands from Nihoa Island to Kure Atoll (Fig. 1). The commercial lobster fishery has operated in the NWHI for almost 16 years. This fishery targets primarily two species: spiny lobster, *Panulirus marginatus*, and common slipper lobster, *Scyllarides squammosus* (henceforth referred to as slipper lobster), which dominate commercially. Two other species--green spiny lobster, *P. pencillatus*, and ridgeback slipper lobster, *S. haanii*, are caught incidentally.

This report details commercial lobster fishing activity in the exclusive economic zone (EEZ) of the NWHI. Current catch, effort, and revenue statistics are based on Federal logbook data and revenue reports. Statistics are presented for the main target species in tabular format, and brief summaries illustrate key points. Evaluations of current conditions of the fishery also are provided. This report concludes with separate sections on administrative and enforcement activities in the fishery.

RECENT DEVELOPMENTS

Several events occurred during 1992 that were of consequence to the NWHI lobster fishery. One of the most significant was the Secretary of Commerce's approval of Amendment 7 to the FMP. This amendment established a 6-month seasonal closure, a limited entry program, and a process (incorporating a formula) to set a total allowable catch (TAC) or fleet-wide quota for the lobster fishery (see Council activities for further details). Consequently, 1992 became the first year the fishery has ever been regulated by a quota system, with the fishing season beginning on July 1, 1992.

Substantial declines in the NWHI commercial lobster CPUE in 1990 and early 1991 caused concerns among scientists and the lobster industry that the fishery had been overexploited.[1] This occurrence was examined by NMFS insular resources staff in early 1992 using NWHI commercial fishery data. They determined that a target fleet catch-per-unit effort (CPUE) of 1.0 lobsters per trap haul, in combination with other management measures, would provide adequate protection for the stocks and allow sustainable exploitation. A CPUE-based population model was used to calculate the 1992 TAC which could be taken under normal recruitment levels to allow a recovery to sustainable yields,

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[1]Polovina et al. (1993) provide an alternative, environmental explanation for this decline.

after a simulated 6-month closed season, while providing an average combined legal spiny and slipper CPUE during the fishing season of 1.0 lobsters per trap-haul.

This quota was initiated in two steps. First, to calculate the July-December 1992 quota, fourth quarter 1991 commercial lobster fishery data and estimated commercial lobster landings during the first quarter of 1992 were used in the CPUE-model with estimates of lobster recruitment and mortality to predict a CPUE value (1.08) for July 1992. This value was then used to estimate the preliminary 1992 NWHI commercial lobster (spiny and slipper) quota or forecast of 750,000 (Haight and Polovina 1992). Second, the final quota was set at 438,000 lobsters for the year, which was determined by the number of legal lobsters caught in the first month of the fishing season. This information was obtained via mandatory in-season, at-sea, call-in catch reports from NWHI lobster fishing vessels. These actual catch and effort figures provided an update on the vitality of the lobster stocks in the NWHI, confirming that they had not made any significant recoveries by the beginning of the 1992 fishing season. Consequently, the final quota was only 58% of the preliminary quota forecast.

The fishing vessel call-in information was very functional in expediting information to establish the final quota. However, the procedures and end results presented some obstacles. One of the most evident problems was that the call-in reports and daily logbook information recorded by vessel operators were not in full accord for all vessels. Resolution of the differences would have been improved noticeably if the total numbers of lobsters landed had been monitored by SWE personnel during vessel off-loading operations. Other problems with this system could be remedied if prearranged call-in schedules were strictly maintained for set days and weeks so that a cutoff date could be established for a predetermined period. As it is, there was much overlap from vessel operators reporting for disparate time periods.

Changes to the procedures for recording and reporting of lobster catches were also initiated by July 1, 1992. These included modification of vessel logbooks that added information on general conditions of the sea surface for each day fished (e.g., wave height, wind speed), changes to vessel transhipment, and sales reports to include number of lobsters by tail weight (in 2-ounce intervals; i.e., 4-6, 6-8 oz), by species. Weight and revenue from sale of octopus by product type and weight and revenue from sale of other fishery products by type were also included.

Commercial NWHI lobster landings, revenue, and trap-hauls more than doubled in 1992 compared to 1991, although the fishery was closed for 3 months during the spring and early summer. The final totals, however, were still only about half the performance of previous years with the combined legal CPUE for 1992

displaying no significant improvement over the drop in CPUE during 1990-91.

Another interesting occurrence in the 1992 fishery was that the number of legal slipper lobsters caught quadrupled, and the revenue more than tripled compared to 1991. This was a good sign to many industry personnel who were concerned that the slipper lobster population had been nearly decimated in previous years.

LANDINGS AND REVENUE

The total combined landings of legal lobsters in pounds in 1992 (wet weight) and ex-vessel revenue are shown in Table 1. NWHI fleet landings and revenue of spiny and slipper lobsters in pounds and metric tons (t) are presented in Table 2. [Tables 1 and 2 contain updates from Clarke et al. (1988), Clarke (1989), and Landgraf et al. (1990).] Estimated landings, ex-vessel prices, and ex-vessel revenue by product type (frozen tails, frozen whole, and live) are shown in Table 3. The long-term trend in annual landings is shown in Figure 2. Long-term revenue is shown in Figure 3.

During January-April 1992, 71,200 lobsters were landed, worth $376,192, while in the July-December 1992 fishing season 353,200 lobsters (81 percent of the final quota) worth $1,716,808 were landed.

FISHING EFFORT

Fishing effort increased in 1992 but was still lower than during 1985-1991 (Figure 4). Annual fishing data show that the number of fishing days more than doubled in 1992 (Table 4) compared to 1991 (Table 5). During January-April, 138,800 traps were hauled compared to 582,800 trap-hauls completed (80 percent of the effort) during the third and fourth quarters.

Out of the 15 vessels allotted limited entry lobster permits under the new management system in 1992, only 12 vessels fished. Three participated in other fisheries and 1 vessel sank en route to fishing grounds in September 1992. During the first quarter, only 4 vessels fished, completing 6 trips, whereas 8 vessels completed 22 trips during the July-December season.

The average number of trap-hauls per fishing day for 1992 was 808, a 15% increase from the 1991 average of 687. Effort was concentrated on three banks--Gardner Pinnacles, Necker Island, and Maro Reef and is reflected in the CPUE by area (Table 4).

CPUE

Table 4 shows CPUE by area for 1992 except for confidential data which is combined under "other" because less than three vessels fished in those areas.

Combined CPUE increased slightly in 1992 (5%) but with a CPUE of 0.59 still failed to compete with the totals of previous years (Figure 5). The CPUE for legal spiny lobsters declined to 0.36 but almost doubled to 0.23 for legal slipper lobsters (Table 4).

Commercial lobster fishing logbooks for the first quarter of 1992 indicated that CPUE was 0.51 for legal lobsters per trap-haul, the lowest recorded during that period since 1983 (when such data was first recorded). By comparison, the CPUE for the same period in 1990 and 1991 was 0.84 and 0.54, respectively.

Analyses of research and fishing logbook data have indicated that recruitment of lobster to the NWHI varies considerably between banks. Necker Island recruitment has remained fairly strong since 1985. Necker Island had a legal spiny lobster CPUE of 0.38 in 1992 (slightly higher than the other areas). Gardner Pinnacles followed with a CPUE of 0.37, and Maro Reef was third with a 0.35 CPUE (Table 4). Historically, Maro Reef accounts for approximately 40% of the catch from the NWHI but has had comparatively low CPUE since 1990, although the number of legal slipper lobsters increased dramatically this year with a CPUE of 0.65 compared to the 1991 showing of 0.16.

VESSEL OPERATIONS

Sea-day analysis of the NWHI lobster fleet in 1992 is reported only in unadjusted modes (Table 6). In previous annual reports, adjusted data on annualized trip activity was presented by deleting incomplete or experimental trips and by projecting partial year participation for individual vessels to a full year's activity. However, adjusted data were not included the past 2 years because of the fishery closures. Based on unadjusted data, the number of fishing days per vessel was higher for all classes of vessels for 1992 compared to 1991. Operations from participating class I vessels are not included in the vessel operation figures because fewer than three vessels fished.[2]

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[2]Vessels were categorized into size, activity, and class by Clarke and Pooley (1988): classes I and I-S are the largest vessels.

ECONOMIC INFORMATION

Prices in 1992 were fairly strong, with an average of around $14 per pound for frozen spiny lobster tails (about $2.20 lower than 1991) (Figure 6). The range of prices varied substantially in 1992, with high prices around $19 per pound for spiny lobster tails and lows around $8 lb for slipper lobster tails. This increased range frequently represents marketing variation due to low supply. Spiny lobster tails have been getting smaller every year but this year has been an exception because more large lobsters (7-10 years old) than ever have been caught.

In recent years Hawaiian spiny lobster tails have been increasingly marketed as a competitive product for the high quality cold-water lobsters from New Zealand, West Australia, South Australia, and South Africa. The market for these cold-water lobster tails was already in the early stages of a severe price decline at the beginning of 1992, and the decline continued for the entire year. Prices were severely depressed for the smaller tails (4-8 oz), with West Australian "B" size (6-8 oz) falling in price to the wholesale trade, from almost $25 per lb in October 1991 to less than $15 per pound by the end of 1992. During 1992 only 9-12 oz sizes resisted the price free-fall, and even these sizes experienced price declines of up to 20%.

During 1992, the market for Hawaiian spiny lobster tails dramatically changed. In January 1992, the highest ex-vessel prices paid in the fishery were around $18.80. Since the competing cold-water tails were in the early stages of a long and severe price decline, the Hawaiian ex-vessel prices rather quickly fell to $16.50-16.00 per lb before the season closed in the spring. When the first landings appeared from the July-December 1992 season, the ex-vessel prices for the larger (12 oz plus) Hawaiian spiny tails fell to about $12 per lb, although the other sizes remained in the $13-14 range. Some fishing vessels with consignment marketing arrangements and some with marketing incentive programs did somewhat better than the cash sellers.

The supply situation for the Hawaiian spiny tails also changed significantly during 1992. In the early part of the year there was a severe shortage of tails larger than 8 oz. There was an oversupply of 4-6-oz tails, and price cutting was common for more than 6 months. By mid-to-late 1992 there was an oversupply of larger tails (12 oz and larger). By the end of the year, price cutting was occurring for all Hawaiian tails larger than 8 oz. Because of the relatively modest quantities of smaller tails landed in late 1992, tails 8 oz and smaller ended the year in very short supply and with firm prices. Live landings of spiny lobsters amounted to about 3% of the total spiny lobster landings (whole weight) with an average price of $9.80.

The 1992 market for Hawaiian slipper lobster tails was unpredictable. Since there is only one closely competitive product (the Brazilian slipper lobster, *S. brasiliensis*), the effect of competitive products on Hawaiian slipper tail prices tends to be insignificant. However, because of relatively poor Hawaiian slipper tail landings in 1990 and 1991, there was virtually no significant market for these tails in mid-to-late-1992. Therefore, ex-vessel prices tended to be low (in the $8 per pound range) with a few smaller trips which were sold for slightly higher prices. There were approximately 2,100 lbs of live slipper lobsters landed with an average price of $9.62 per lb.

During the course of the year, the market for Hawaiian slipper lobster tails was rehabilitated somewhat, and the year ended with modest inventories and very firm prices.

BIOLOGICAL ASSESSMENT

Analyses of commercial fishery data from 1983 through 1992 indicated that recruitment to the lobster fishery dropped 50% after 1989 (Fig. 7) (Haight and Polovina 1992). Recent research suggests that productivity has declined for a number of NWHI species besides lobsters (i.e., seabirds, monk seals, and reef fish). Data indicate that a significant change in the physical marine environment occurred in the North Pacific during the late 1970s to 1990, then returned to normal levels by the early 1990s. This period was characterized by stronger winds and deepening of the mixed surface layer and depth of the 15-degree isotherm (i.e., warm surface water extended further down). It also suggests that the entire subtropical circulation gyre shifted southward during this period (Polovina et al. in prep).

There is some evidence that lower lobster recruitment levels may also be a result of a reduction in lobster spawning biomass. Results of forward simulation population modeling incorporating reduced recruitment suggest that the lobster stocks may take at least 2 years to rebuild to FMP-mandated CPUE levels and that future exploitation of the NWHI lobster population should be at lower levels than during the 1983-89 period. Therefore, to attain a long-term season CPUE of 1.0, the fishery will probably run a 30% risk of a closure in alternate years. Current analysis suggests that the NWHI lobster stocks will not have recovered sufficiently to allow a commercial fishery in 1993. Therefore, the preseason quota forecast is 0 lobster.

RESEARCH

Biological Research

In the NWHI ecosystem, biological time series data collected since the 1980s on lobsters, monk seals, sea birds, and reef fishes all showed declines in productivity of 30-50% from the early 1980s to the early 1990s (Polovina et al. in prep). All available data are consistent with the hypothesis that this physical change resulted in higher biological productivity which reached a maximum in the early 1980s and has now returned to long-term levels. Recent observed declines in productivity at higher trophic levels represent a response to the return to lower, long-term primary productivity.

Long-term (decadal-scale) environmental regimes (e.g., broad-scale circulations and vertical mixing patterns) may have major impacts on the productivity of commercial marine resources (e.g., lobsters, swordfish) and endangered species (e.g., monk seals) independent of the fisheries themselves.

ENDANGERED AND THREATENED SPECIES INTERACTIONS

Summaries of interactions with endangered and threatened species in the NWHI lobster fishery are based on information received from the daily lobster catch reports and outlined in Table 7. In August 1992, the duties of monitoring the protected species interactions were undertaken by the PAO.

No occurrences of actual physical interactions were reported, and the degree to which interactions are underreported is unknown. The numbers of sightings or interactions shown on log book reports are not necessarily an accurate indicator of the actual number of encounters between the fishery and protected species.

COUNCIL ACTIVITIES

The WPFMC is the policy-making organization for the management of fisheries in the EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands and other U.S. possessions in the Pacific. The WPFMC prepares and modifies Fishery Management Plans (FMPs) for domestic and foreign fishing in the region, based on advice from scientific and industry advisors as well as input from the general public. Regulations are administered by the NMFS and are enforced jointly by NMFS agents and the U.S. Coast Guard. The FMP for crustaceans (primarily lobster) was implemented in 1983 and has been amended seven times as conditions in the fishery have changed.

In 1992, Amendment 7 to the FMP established a new system of management for the NWHI lobster fishery. Entry to the fishery would be limited to 15 vessels, with limited entry permits being freely transferable, the fishing season would be closed for six months (from January through June); the fleet would be restricted to a TAC, or fleet quota, and each vessel could use no more than 1,100 traps. The final rule implementing the amendment was published in the Federal Register on March 26, 1992 (57 fr 10437). The fishery was closed on April 10, 1992, and the remaining regulations took effect on April 27, 1992. The regular season then opened on July 1, 1992.

Before the new management system took effect, the Council's Crustacean Plan Team met in February 1992 to discuss several alternative management strategies and to make recommendations to the Council. The options discussed included a fishery for male lobsters only, increasing the legal minimum size, opening Laysan Island to lobster fishing, rotating closed areas in the NWHI, individual quotas, changing the definition of overfishing in light of the importance of lobsters as prey for Hawaiian monk seals, and separate quotas for slipper and spiny lobsters. At that time, the Team recommended that the Council take action on none of those options. The Team did provide recommendations on methods for marking lobster traps and for the reporting procedures used by fishermen to call in their catch to be counted against the fleet quota. WPFMC's Scientific and Statistical Committee concurred with the Team's recommendations, and the Council took no action to change the management system but did suggest that the Team review the fishery after the 1992 season to determine whether refinement of the management system would be needed.

In September 1992, the Council requested its staff to organize a meeting in January 1993 for the Plan Team, Advisory Panel, NWHI fishermen, and enforcement agents. The purpose of the meeting was to review the operations details of the 1992 fishery and recommend any changes to the Council at its April 1993 meeting.

ADMINISTRATIVE ACTIVITIES

Under the newly established limited entry program for the NWHI lobster fishery, the Regional Director, Southwest Region, NMFS issued 15 permits to vessel owners who had applied for and qualified for permits (Table 8).

Issuance of initial limited entry permits--restricted to a maximum of 15--was based primarily on three eligibility criteria and a point system as specified by federal regulations (50 CFR §681.30). Priority for permit issuance was given to (in descending order): (1) an owner of a vessel that made at least one landing of lobster from the NWHI before August 8, 1985, and

during every calendar year from 1985 through 1990; (2) an owner of a vessel that made at least one landing of lobster from the NWHI before August 8, 1985, and during calendar year 1990; and (3) an owner of a vessel that made at least one landing of lobster during 1990 only.

ENFORCEMENT ACTIVITIES AND VIOLATIONS

At-sea enforcement efforts in 1992 consisted of 4 aerial patrols conducted with U.S. Coast Guard aircraft. The Enforcement Division has primarily relied on dockside enforcement at the time of off-loading to determine compliance with the regulatory requirements of the management plan. It was the intention of the SWE during the 1992 season to provide an accurate and thorough boarding of as many of the returning lobster vessels as possible under the new management regime. This goal proved difficult to attain because of the uncertainty of exact unloading locations and times by vessels returning to Honolulu. All vessels fishing under this plan are still required to notify the Coast Guard and the NMFS Office of Enforcement 24 hours prior to landing their catches. This requirement was not sufficient to provide agents with timely and cost-effective scheduling to accomplish the boarding. On one occasion two agents worked through a holiday in an effort to deliver a timely boarding only to find that the vessel in question had stopped in Kauai and, therefore, its arrival in Honolulu was delayed.

NMFS Enforcement is concerned about the timeliness of inspections. In an effort to provide a minimum of interference to vessel off-loading procedures, SWE has asked vessel operators precisely when they will unload in order to provide a valid and timely work product.

During 1992, nine lobster vessel boardings were accomplished. These boardings and subsequent investigations resulted in detecting violations and assessing penalties in six cases. One vessel was cited for possessing lobster traps in the NWHI during closed season, one vessel was cited for failure to report landing, two vessels were cited for possession of short lobster tails, and two vessels were cited for possession of egg-bearing lobsters.

Over 400 investigative hr were expended by NMFS special agents exclusively on the crustacean FMP. This does not include the estimated 200 hr expended by deputized officers from the Hawaii Marine Patrol and the Department of Conservation and Resource Enforcement. The task of checking every lobster tail from selected loads of commercial lobster vessels during off-loading operations was accomplished with the assistance from the State of Hawaii, Department of Conservation and Resource Enforcement, and the State of Hawaii Marine Patrol.

Intensive dockside enforcement will continue as the most effective method of enforcing the provisions of this management plan.

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Table 1.--Annual landings (number and pounds), ex-vessel revenues (US$), fishing effort (trap-hauls, vessels, and trips), catch-per-unit effort (CPUE; number of legal lobster per trap-haul), and prices (US$/lobster) of slipper and spiny lobsters combined from the Northwestern Hawaiian Islands, 1977-92. Data are from vessel logbooks and revenue reports for 1983-92, and from NMFS shoreside monitoring from 1977-83.

Year	Landings		Revenue[b] ($)	Trap-hauls (No.)	Vessels (No.)	Trips (No.)	Combined legal CPUE[c]	Price/ lobster
	No.	Pounds[a]						
1977	--	72,000	209,000	--	5	14	--	--
1978	--	45,000	135,000	--	2	12	--	--
1979	--	100,000	320,000	--	2	6	--	--
1980	--	328,000	1,114,000	--	3	12	--	--
1981	--	780,000	2,730,000	--	10	25	--	--
1982	148,214	187,000	673,000	47,738[e]	7	19	3.10	4.54
1983[d]	234,700	203,000	591,000	84,870	4	19	2.77	2.52
1984	872,400	1,017,000	2,624,000	363,000	11	38	2.40	3.01
1985	1,812,700	2,368,000	5,887,000	983,062	16	62	1.80	3.21
1986	1,787,400	2,202,000	3,982,000	1,352,580	16	60	1.32	3.35
1987	737,800	969,000	3,988,000	804,723	11	38	0.92	5.41
1988	1,057,600	1,405,000	5,000,000	845,200	9	28	1.25	4.73
1989	1,160,250	1,470,000	6,291,000	1,071,538	11	33	1.08	5.42
1990	774,300	949,000	4,887,000	1,182,485	14	45	0.66	6.31
1991	166,700	183,000	1,028,000	296,648	9	21	0.56	6.16
1992	424,400	466,000	2,093,000	721,682	12	28	0.59	4.93

[a]Includes the weight of frozen lobster tails expanded to represent whole weight (spiny lobster tail weight = 35.6% of whole weight; slipper lobster tail weight = 33.3% of whole weight).
[b]Revenue is reported on a per-trip basis. Some trips overlap years; revenue for those trips is prorated to each year.
[c]Legal CPUE for slipper lobster before 1988 is calculated as 0.72 multiplied by the number of retained slipper lobsters.
[d]The 1983 annual values were estimated from logbook returns from the last 9 months of the year.
[e]Estimate is from Clarke and Yoshimoto (1990).

Table 2.--Estimated landings, ex-vessel prices (US$/lb), and ex-vessel revenues (US$) of spiny and slipper lobsters landed from the Northwestern Hawaiian Islands, 1977-92. Data are from vessel logbooks and revenue reports for 1983-92, and from NMFS shoreside monitoring from 1977-83.

	Spiny lobster				Slipper lobster			
Year	Pounds[a]	Metric tons	Price ($/lb)	Revenue ($)	Pounds[b]	Metric tons	Price ($/lb)	Revenue ($)
1977	72,000	33	2.90	209,000	--	--	--	--
1978	45,000	20	3.00	135,000	--	--	--	--
1979	100,000	45	3.20	320,000	--	--	--	--
1980	328,000	149	3.40	1,115,000	--	--	--	--
1981	780,000	354	3.50	2,730,000	--	--	--	--
1982	187,000	85	3.60	673,000	--	--	--	--
1983	203,000	92	2.91	591,000	--	--	--	--
1984	935,000	424	2.66	2,490,000	82,000	37	1.63	134,000
1985	1,438,000	652	2.94	4,227,000	930,000	423	1.78	1,660,000
1986	1,149,000	521	3.23	3,710,000	1,053,000	479	2.16	2,272,000
1987	530,000	241	4.67	2,479,000	439,000	200	3.44	1,509,000
1988	1,218,000	553	3.66	4,453,000	186,000	85	3.12	581,000
1989	1,266,000	574	4.44	5,624,000	203,000	93	3.28	667,000
1990	784,000	356	5.51	4,319,000	165,000	75	3.43	567,000
1991	150,000	68	6.06	911,000	33,000	15	3.54	117,000
1992	318,000	144	5.20	1,654,000	148,000	69	2.96	439,000

[a]Includes frozen lobster tails expanded to represent whole weight (tail weight = 35.6% of whole weight).

[b]Includes frozen lobster tails expanded to represent whole weight (tail weight = 33.3% of whole weight).

Table 3.--Estimated landings (product weight), ex-vessel price (US$/lb), and ex-vessel revenue (US$), by product type, from the Northwestern Hawaiian Islands, 1990-92. Data are from vessel revenue reports; dashes indicate that the data are not available or are confidential and therefore excluded.

			Spiny Lobster				Slipper Lobster					
Year	Product	Type	Pounds	Metric tons	Price ($)	Revenue ($)	Pounds	Metric tons	Price ($)	Revenue ($)	Vessels (No.)	Trips (No.)
1990	Live		57,900	26	7.27	421,300	6,000	3	6.66	41,000	6	16
	Frozen	Whole	500	--[a]	8.00	4,000	--	--	--	--	--	--
	Frozen	Tail	258,300	117	15.07	3,894,000	53,200	24	9.94	526,800	14	43
1991	Live		5,900	3	8.02	47,400	2,500	1	7.63	19,200	4	11
	Frozen	Whole	350	--[a]	10.49	3,700	--	--	--	--	--	--
	Frozen	Tails	51,300	23	16.77	859,900	10,000	5	9.61	97,900	9	14
1992	Live		10,100	--	9.77	98,700	2,100	--[a]	9.62	20,500	4	10
	Frozen	Whole	--	--[a]	--	--	--	--[a]	--	--	--	--
	Frozen	Tails	110,000	50	14.19	1,554,200	49,000	22	8.60	418,870	11	23

[a]Less than 1 metric ton landed.

Table 4.--Annual fishing effort (days fished and trap-hauls) and catch-per-unit effort (CPUE; number of lobster per trap-haul) for spiny and slipper lobsters in the Northwestern Hawaiian Islands, 1992. Data are from vessel logbooks.

Area	Days fished (No.)	Trap-hauls (No.)	Catch-per-unit effort							
			Spiny lobster				Slipper lobster			
			Legal	Sublegal	Berried	Total	Legal	Sublegal	Berried	Total
Necker	424	347,288	0.38	0.69	0.15	1.22	0.10	0.02	0.02	0.13
St. Rogatien Bank	4	1,140	0.04	0.01	0.01	0.06	0.12	0.03	0.01	0.17
Gardner Pinnacles	232	197,943	0.37	0.18	0.12	0.67	0.11	0.03	0.02	0.16
Maro Reef	179	138,851	0.35	0.10	0.06	0.52	0.65	0.23	0.13	1.01
Other[a]	54	4,700	0.12	0.03	0.03	0.18	0.26	0.06	0.03	0.35
Total	893	721,682	0.36	0.40	0.12	0.88	0.23	0.07	0.04	0.33

[a]Includes Brooks Bank, Lisianski Island, Nihoa, Pearl and Hermes Reef, and French Frigate Shoals.

Table 5.--Annual fishing effort for active vessels in the Northwestern Hawaiian Islands lobster fishery, 1983-92. Number of vessels, trips, fishing days and trap hauls. Fishing days per vessel are adjusted (see Table 8). Data are from vessel logbooks.

Year	Vessels	Trips	Fishing days	Fishing days/ per vessel	Trap-hauls
1983	4	19	279	--	84,870
1984	11	38	822	--	363,000
1985	16	62	1,653	--	983,062
1986	16	80	2,166	--	1,352,580
1987	11	38	1,217	120	804,723
1988	9	28	1,617	139	845,200
1989	11	33	1,323	120	1,071,538
1990	14	45	1,468	109	1,182,485
1991	9	21	432	43[a]	296,648
1992	12	28	893	74[a]	721,682

[a]Fishing days/per vessel for 1991-92 are unadjusted because of the fishery closure.

Table 6.--Number of vessels, trips, and sea days, by vessel class, for the lobster fleet in the Northwestern Hawaiian Islands, 1992. Unadjusted figures include incomplete trips; adjusted figures that correct for vessels fishing less than full time and for incomplete trips are not used in 1992 because of the fishery closure in mid-year. Standard deviations are in parentheses; data are compiled from vessel logbooks.

Vessels		Trips	Sea	Mean number of sea days by activity per vessel						
Class	No.	(No.)	days	Fishing	Traveling	Running	Weather	Breakdown	Rest/deck work	Missing
I	2	4	— —	— —	— —	— —	— —	— —	— —	— —
II	7	15	113.4(48.9)	88.6(48.9)	17.1(9.8)	5.7(6.3)	0.6(1.1)	0.0(0.0)	1.4(2.0)	0.0(0.0)
III	3	9	82.0(43.4)	49.3(43.4)	22.7(8.5)	0.3(0.6)	6.7(6.1)	0.0(0.0)	3.0(3.5)	0.0(0.0)
Total Fleet	12	28	99.3(49.6)	71.9(38.3)	18.3(9.5)	3.6(5.4)	2.0(3.9)	0.5(1.7)	2.7(4.0)	0.3(0.9)

—Indicates confidential data.

Table 7.--Reported sightings of or interactions with endangered or threatened species by the lobster fleet in the Northwestern Hawaiian Islands, 1992. Data are from the vessel logbooks.

Area	No. of sightings by No. of animals	
	One animal	Two animals
Monk seals observed in statistical area		
Gardner Pinnacles	2	0
Nihoa	1	8
Necker Island	21	1
Maro Reef	1	0
Pearl & Hermes Reef	4	0
Monk seals observed in vicinity of fishing gear		
French Frigate Shoals	1	0
Gardner Pinnacles	3	0
Necker Island	6	0
St. Rogatien	1	0
Turtles observed in statistical area		
Necker	2	0
Pearl & Hermes Reef	1	0

Table 8.--Fishing vessels with limited entry permits for the 1992 Northwestern Hawaiian Islands lobster fishery.

Aleutian Spray	*Dominis**	*Marie M*
Archer	*Haida*	*Miss Jessico*
Betty N	*Liberty*	*Ocean Challenger*
Bounty	*Lusty*	*Petite One*
*Cornucopia**	*Magic Dragon**	*Sea Spray**

The Regional Director also approved the transfer of three permits (*Haida, Laysan, Shaman*) without the sale of a vessel which is allowed under the limited entry program.

In 1992, permits for lobster fishing in federal waters of the main Hawaiian Islands (Permit Area 2) were issued to two vessels: *Kuma* and *Lea Lea*.

*These vessels did not participate in the Northwestern Hawaiian Islands lobster fishery during 1992.

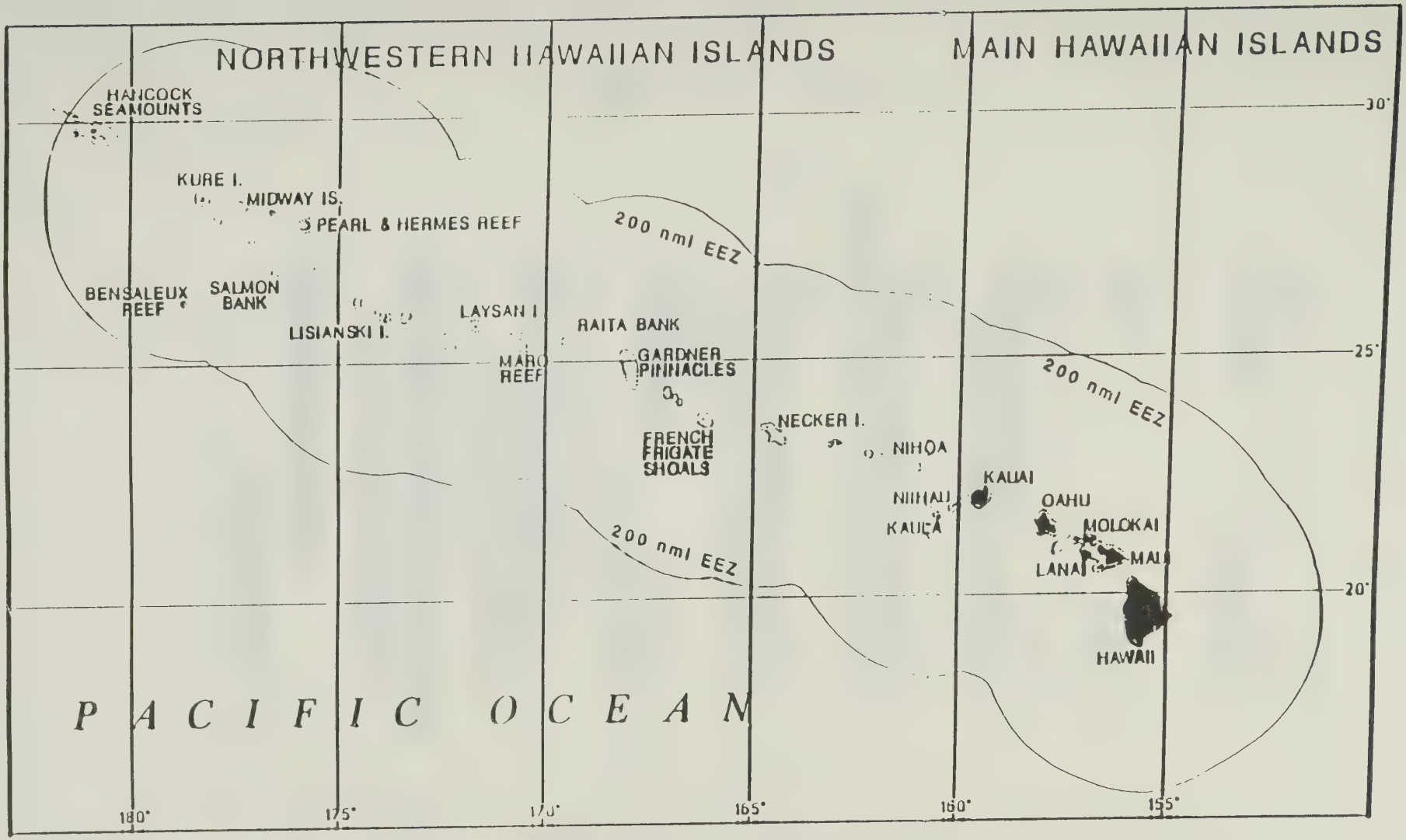


Figure 1.--Map of the Northwestern Hawaiian Islands (permit area 1), the main Hawaiian Islands (permit area 2) and the 200 nmi Exclusive Economic Zone (EEZ).

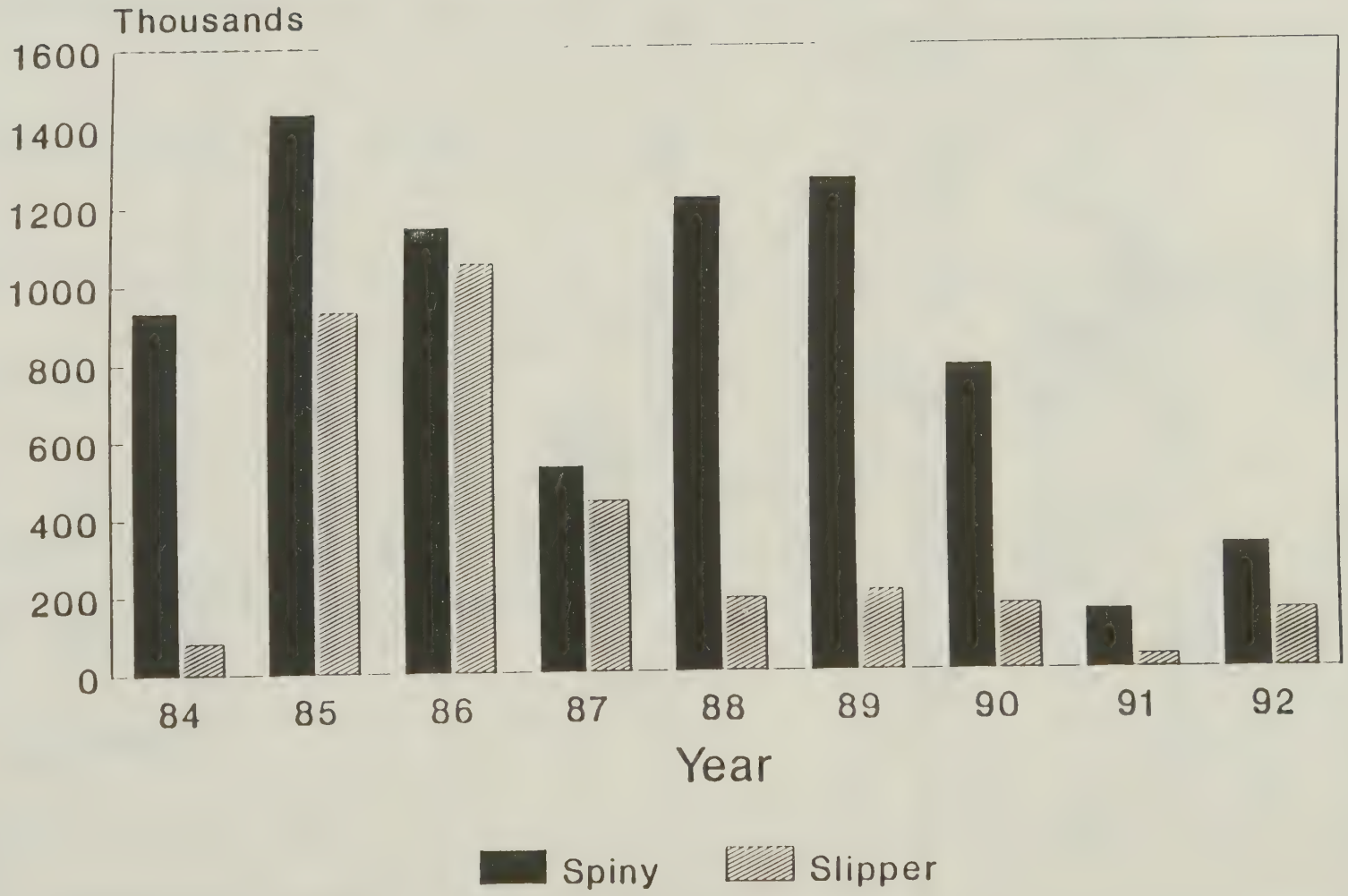


Figure 2.--Estimated annual landings (1,000 lbs wet weight) of spiny and slipper lobsters in the Northwestern Hawaiian Islands, 1984-92.

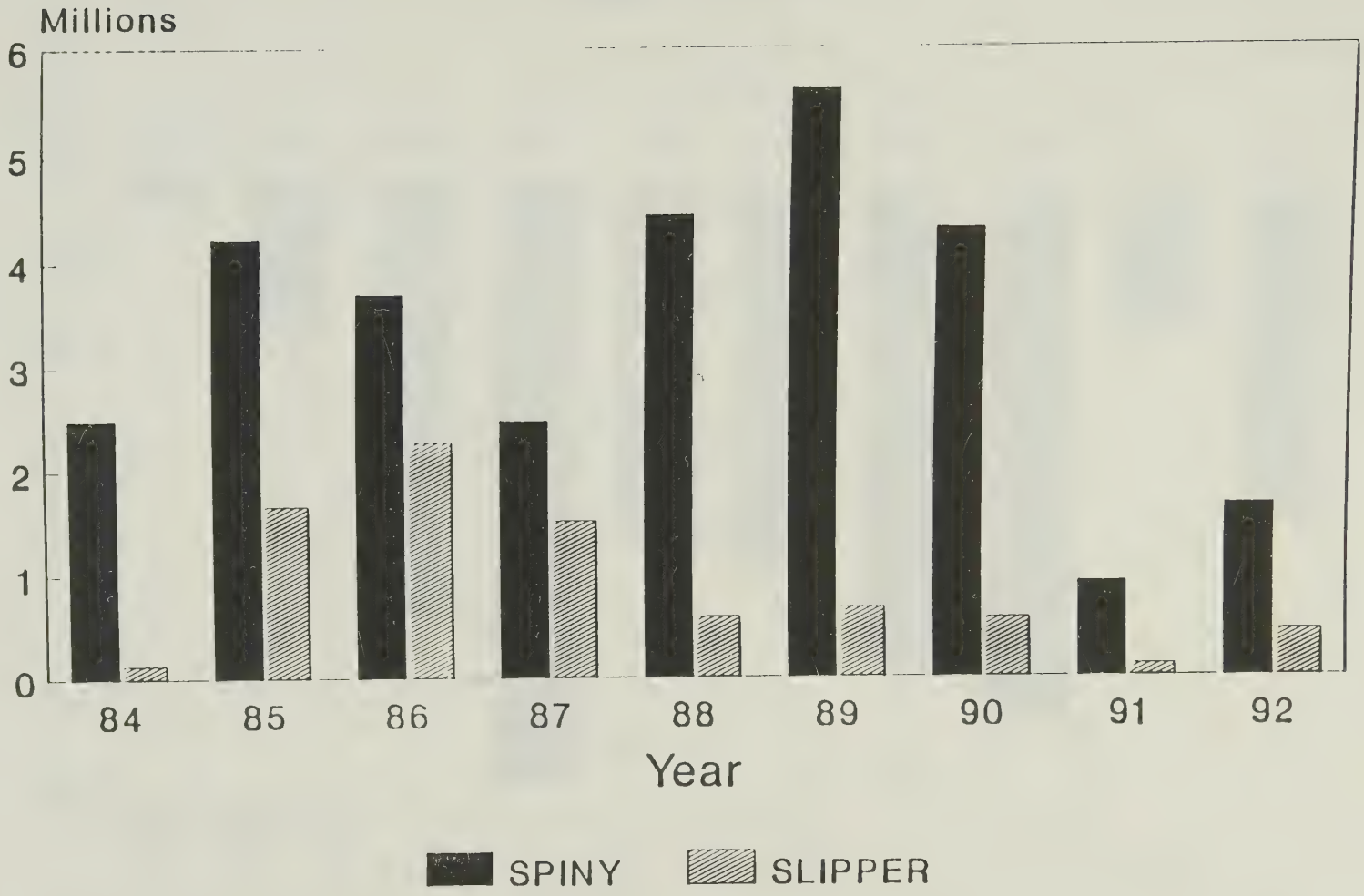


Figure 3.--Ex-vessel revenue for spiny and slipper lobsters from the Northwestern Hawaiian Islands, 1984-92.

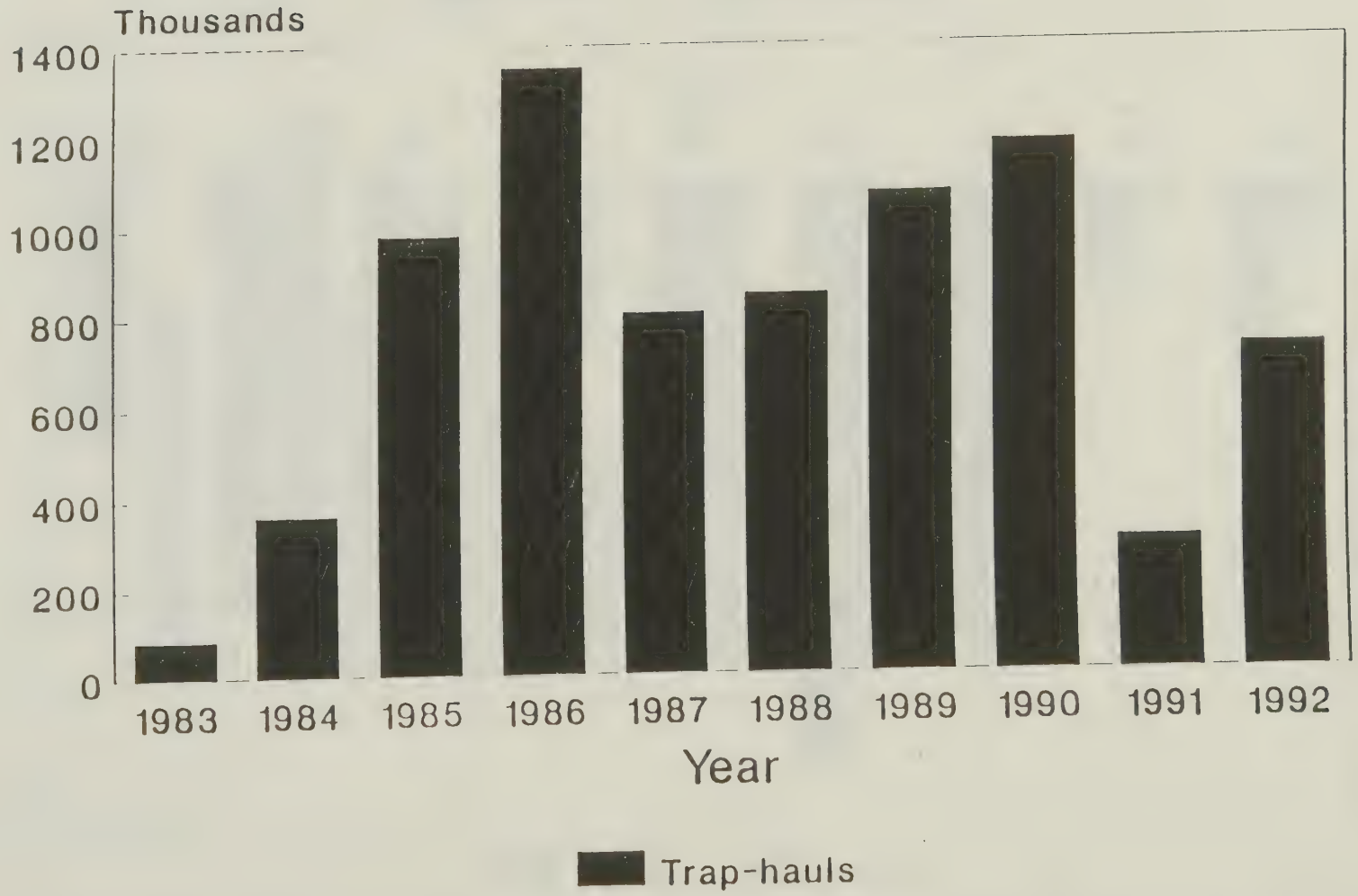


Figure 4.--Fishing effort (trap-hauls) by the Northwestern Hawaiian Islands lobster fleet, 1983-92.

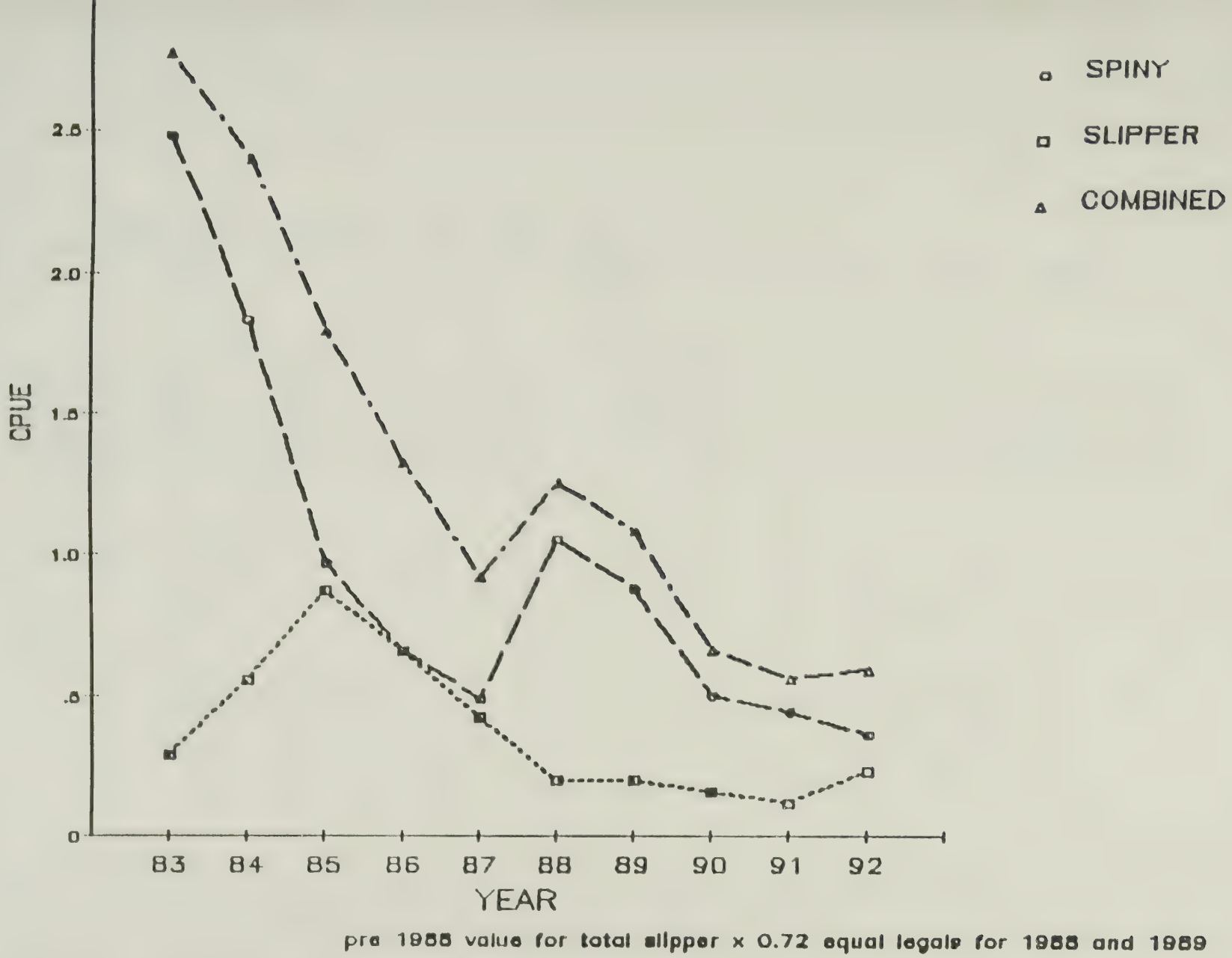
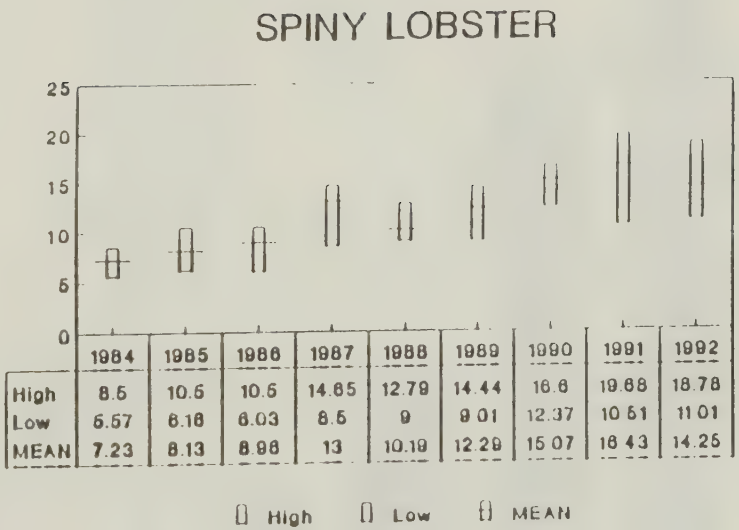


Figure 5.--Catch-per-unit effort (CPUE) for spiny and slipper lobsters from the Northwestern Hawaiian Islands, 1983-92. (CPUE for slipper lobster is calculated as 0.72 multiplied by the number retained before 1988.)



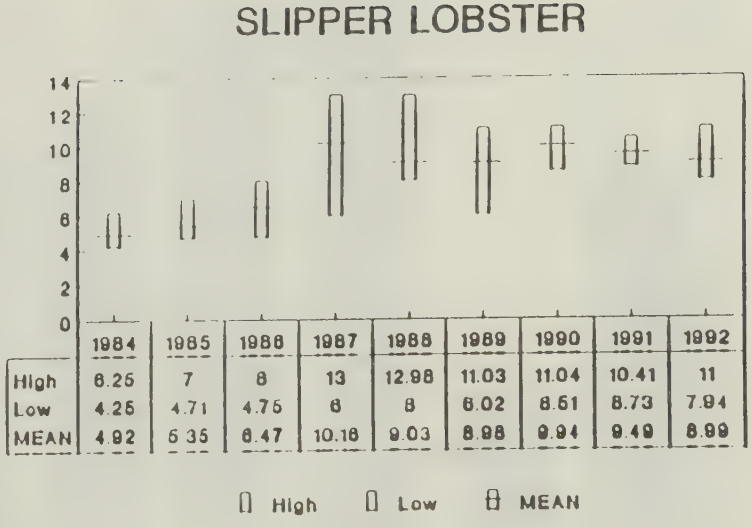


Figure 6.--Low, mean, and high ex-vessel prices of frozen spiny and slipper lobster tails from the Northwestern Hawaiian Islands, 1984-92.

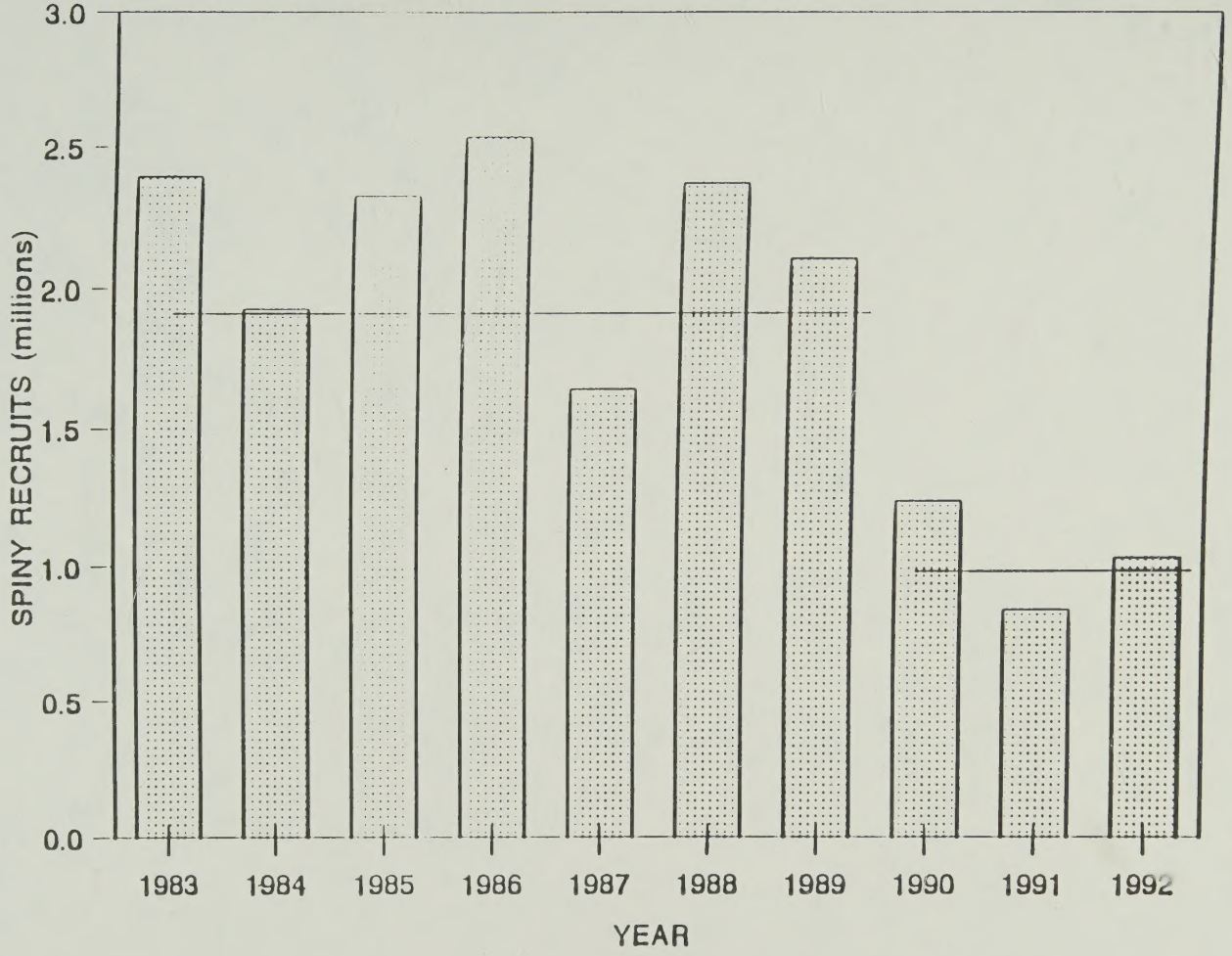


Figure 7.--Estimated annual recruitment of spiny lobsters to the Northwestern Hawaiian Islands lobster fishery 1983-92. Horizontal lines indicate the average annual recruitment for the years 1983-89 and 1990-92.